

एग्रीकल्चर विभाग

**NEW AND RESTRUCTURED**  
**POST GRADUATE CURRICULA AND SYLLABUS**  
for  
**Entomology**

**Dr. Rammanohar Lohia Avadh University, Ayodhya (U.P.)**

**M.Sc. (Ag.) Entomology**

**Forth Semester**

(Semester System as per ICAR 5th Dean Committee Recommendations)

**w.e.f. 2020 - 2021**

*Submitted by :*

**Dean & Conveners, Board of Studies**  
**Faculty of Agriculture**

**Dr. Rammanohar Lohia Avadh University, Ayodhya (U.P.)**

### M.Sc. (Ag.) Entomology

Ist Semester			Evaluation Marks			
Code No.	Course Title	Credit Hours	Mid Term	End Term	Practical	Total
AE - 501	Insect Morphology	4(3+1)	20	50	30	100
AE - 502	Insect Systematic	3(2+1)	20	50	30	100
AE - 503	Insect Anatomy, Physiology and Nutrition	3(2+1)	20	50	30	100
AS - 501	Agricultural Statistics	3(2+1)	20	50	30	100
PGS - 501	Library and Information Services (Non gradial 50% marks required for satisfactory)	1(0+1)	-	-	100	100
<b>Total Credit</b>		<b>14</b>				
IInd Semester			Evaluation Marks			
Code No.	Course Title	Credit Hours	Mid Term	End Term	Practical	Total
AE - 504	Insect Ecology	3(2+1)	20	50	30	100
AE - 505	Toxicology Of Insecticides	3(2+1)	20	50	30	100
AE - 506	Plant Resistance To Insects	3(2+1)	20	50	30	100
PGS - 505	Agricultural research, research ethics and Rural development Programmes (Non gradial 50% marks required for satisfactory)	2(2+0)	40	60	-	100
PGS - 502	Technical Writing And Communications Skills (Non gradial 50% marks required for satisfactory)	1(0+1)	-	-	100	100
PGS - 503	Intellectual Property and Its Management In Agriculture (Non gradial 50% marks required for satisfactory)	1(1+0)	40	60	-	100
AE - 507	Integrated Insect Pest Management	3(2+1)	20	50	30	100
<b>Total Credit</b>		<b>16</b>				
IIIrd Semester			Evaluation Marks			
Code No.	Course Title	Credit Hours	Mid Term	End Term	Practical	Total
AE - 508	Advance Techniques In Plant Protection	3(2+1)	20	50	30	100
AE - 509	Biological Control	3(2+1)	20	50	30	100
AE - 510	Insect Vectors of Plant Viruses and other Pathogens	3(2+1)	20	50	30	100
CA - 502	Computer application in Agriculture	2(1+1)	20	50	30	100
PGS - 504	Basic Concepts In Laboratory Techniques (Non gradial 50% marks required for satisfactory)	1(0+1)	-	-	100	100
<b>Total Credit</b>		<b>12</b>				
IVth Semester			Evaluation Marks			
Code No.	Course Title	Credit Hours	Mid Term	End Term	Practical	Total
AE - 591	Master's Seminar	1(0+1)				100
AE - 599	Master Research (Thesis)	20	Satisfactory/Unsatisfactory			
<b>OR</b>						
<b>Special Papers - (20 - Credit) Satisfactory/Unsatisfactory</b>						
AE - 511	Principles of Insect Pest Management	4(3+1)	20	50	30	100
AE - 512	Biological Control of Crop Pests and Weeds	4(3+1)	20	50	30	100
AE - 513	Pests of Field Crops	4(3+1)	20	50	30	100
AE - 514	Pests of Horticultural and Plantation Crops	4(3+1)	20	50	30	100
AE - 515	Storage Pest and Their Management	4(3+1)	20	50	30	100
<b>Total Credit</b>		<b>21</b>				
<b>Total Credit Hours</b>		<b>63</b>				



## M.Sc. (AG.)-ENTOMOLOGY

### IV<sup>th</sup> SEMESTER CURRICULA & SYLLABUS

S.No.	Course Code	Title of the Course	Credit
1.	AE-591	Master's Seminar	1(0+1)
2.	AE-599	Master's Thesis  <b>or five Special Paper</b>	20
3.	AE-511	Principles of insect pest management	4(3+1)
4.	AE-512	Biological Control of Crop Pests and Weeds	4(3+1)
5.	AE-513	Pests of Field Crops	4(3+1)
6.	AE-514	Pests of Horticultural and Plantation Crops	4(3+1)
7.	AE-515	Storage Pest And Their Management	4(3+1)
<b>Total Credit Hours</b>			<b>21</b>

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M.Sc. (AG)-ENTOMOLOGY IV<sup>th</sup> SEMESTER SYLLABUS

AE-511

**PRINCIPLES OF INSECT PEST MANAGEMENT**

4(3+1)

**OBJECTIVE**

To familiarize the students with principles of insect pest management, including concept and philosophy of integrated pest management (IPM). Train students in computation of ETL, implementing IPM programmes.

**THEORY :**

UNIT I

History and concepts; ecological and sociological aspects; determination of single- and multi-pest economic injury level, and natural enemy- based economic levels.

UNIT II

Dimensions of insect plant interactions and advances in varietal resistance including transgenics to crop pests; biological, chemical, legal, cultural, genetic, behavioural and other management tactics and development of PM modules; impact assessment.

UNIT III

Analysis of spatial distribution, sampling, measuring economic levels of damage and modeling; biotype development and importance of biosystematics in pest diagnostics; bio-intensive IPM; bio-pesticides and toxicology in pest management, sanitary and phytosanitary measures; effect of radiations on insects, sterile male techniques.

UNIT IV

Wide area management of epidemics of crop pests; case studies on pests of national importance and their management.

**PRACTICAL :**

Characterization of agro-ecosystems; sampling methods and factors affecting sampling; population estimation methods; crop loss assessment direct losses, indirect losses, potential losses, avoidable losses, unavoidable losses. Computation of EIL and ETL; crop modeling; designing and implementing IPM system.

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M.Sc. (AG)-ENTOMOLOGY IV<sup>th</sup> SEMESTER SYLLABUS

AE-512

**BIOLOGICAL CONTROL OF CROP PESTS AND WEEDS**

4(3+1)

**THEORY :**

UNIT I

History, principles and scope of biological control; important groups of parasitoids, predators and pathogens; principles of classical biological control- importation, augmentation and conservation.

UNIT II

Biology, adaptation, host seeking behaviour of predatory and parasitic groups of insects. Role of insect pathogenic nematodes, viruses, bacteria, fungi, protozoa etc., their mode of action. Biological control of weeds using insects.

UNIT III

Mass production of quality biocontrol agents- techniques, formulations, economics, field release/ application and evaluation.

UNIT IV

Successful biological control projects, analysis, trends and future possibilities of biological control. Importation of natural enemies- Quarantine regulations, biotechnology in biological control. Semiochemicals in biological control.

**PRACTICAL :** Identification of common natural enemies of crop pests (parasitoids, predators, microbes) and weed killers. Visits (only where logistically feasible) to bio-control laboratories to learn rearing and mass production of egg, egg-larval, larval, larval-pupal and pupal parasitoids, common predators, microbes and their laboratory hosts, phytophagous natural enemies of weeds. Field collection of parasitoids and predators. Hands-on training in culturing, identification of common insect pathogens. Quality control and registration standards for biocontrol agents.

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M.Sc. (AG)-ENTOMOLOGY IV<sup>th</sup> SEMESTER SYLLABUS

AE-513

**PESTS OF FIELD CROPS**

4(3+1)

OBJECTIVE

To familiarize the students about nature of damage and seasonal incidence of insect pests that cause loss to major field crops and their effective management by different methods.

THEORY :

UNIT I

Systematic position, identification, distribution, host-range, bionomics, nature and extent of damage, seasonal abundance and management of insect and mite pests and vectors.

UNIT II

Insect pests of cereals and millets and their management. Polyphagous pests: grasshoppers, locusts, termites, white grubs, hairy caterpillars, and non-insect pests (mites, birds, rodents, snails, slugs etc.).

UNIT III

Insect pests of pulses, tobacco, oilseeds and their management.

UNIT IV

Insect pests of fibre crops, forages, sugarcane and their management

PRACTICAL :

Field visits, collection and identification of important pests and their natural enemies; detection and estimation of infestation and losses in different crops; study of life history of important insect pests.

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**M.Sc. (AG.)-ENTOMOLOGY IV<sup>th</sup> SEMESTER SYLLABUS**

**AE-514**

**PESTS OF HORTICULTURAL AND PLANTATION CROPS**

**4(3+1)**

**OBJECTIVE**

To impart knowledge on major pests of horticultural and plantation crops regarding the extent and nature of loss, seasonal history, their integrated management.

**THEORY :**

**UNIT I**

Systematic position, identification, distribution, host range, bionomics and seasonal abundance, nature and extent of damage and management of insect pests of various crops.

**UNIT II**

Fruit Crops- mango, guava, banana, jack, papaya, pomegranate, litchi, grapes, ber, fig, citrus, aonla, pineapple, apple, peach and other temperate fruits.

**UNIT III**

Vegetable crops- tomato, potato, radish, carrot, beetroot, cole crops, French beans, chow-chow, brinjal, okra, all gourds, gherkin, drumstick, leafy vegetables etc.

**UNIT IV**

Plantation crop- coffee, tea, rubber, coconut, arecanut, cashew, cocoa etc.; Spices and Condiments- pepper, cardamom, clove, nutmeg, chillies, turmeric, ginger, beetlevine etc.

**UNIT V**

Ornamental, medicinal and aromatic plants and pests in polyhouses/protected cultivation.

**PRACTICAL :**

Collection and identification of important pests and their natural enemies on different crops; study of life history of important insect pests and non insect pests.

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M.Sc. (AG.)-ENTOMOLOGY IV<sup>th</sup> SEMESTER SYLLABUS

AE-515

**STORAGE PEST AND THEIR MANAGEMENT**

4(3+1)

**THEORY :**

UNIT I

Introduction, history of storage entomology, concepts of storage entomology and significance of insect pests. Post-harvest losses *in toto visà-vis* total production of food grains in India. Scientific and socio-economic factors responsible for grain losses.

UNIT II

Important pests namely insects, mites, rodents, birds and microorganisms associated with stored grain and field conditions including agricultural products; traditional storage structures; association of stored grain insects with fungi and mites, their systematic position, identification, distribution, host range, biology, nature and extent of damage, role of field and cross infestations and natural enemies, type of losses in stored grains and their effect on quality including biochemical changes.

UNIT III

Ecology of insect pests of stored commodities/grains with special emphasis on role of moisture, temperature and humidity in safe storage of food grains and commodities. Stored grain deterioration process, physical and biochemical changes and consequences. Grain storage- types of storage structures i.e., traditional, improved and modern storage structures in current usage. Ideal seeds and commodities' storage conditions.

UNIT IV

Important rodent pests associated with stored grains and their non-chemical and chemical control including fumigation of rat burrows. Role of bird pests and their management. Control of infestation by insect pests, mites and microorganisms. Preventive measures- Hygiene/sanitation, disinfestations of stores/receptacles, legal methods. Curative measures- Non-chemical control measures- ecological, mechanical, physical, cultural, biological and engineering. Chemical control- prophylactic and curative- Characteristics of pesticides, their use and precautions in their handling with special emphasis on fumigants. Integrated approaches to stored grain pest management.

**PRACTICAL :**

Collection, identification and familiarization with the stored grains/seed insect pests and nature of damage caused by them; detection of insect infestation in stored food grains; estimation of losses in stored food grains; determination of moisture content in stored food grains; familiarization of storage structures, demonstration of preventive and curative measures including fumigation techniques; treatment of packing materials and their effect on seed quality. Field visits to save grain campaign, central warehouse and FCI warehouses and institutions engaged in research or practice of grain storage like CFTRI, IGSMRI, Hapur etc. (only where logistically feasible)

